

IFW 3742

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 Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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<h1 style="margin: 0;">FEE TRANSMITTAL</h1> <p style="font-size: small; margin: 5px 0;">Patent fees are subject to annual revision.</p> <div style="border: 1px solid black; border-radius: 50%; width: 100px; height: 100px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;"> <p style="margin: 0;">AUG 2 5 2004</p> <p style="font-size: x-small; margin: 0;">PATENT &amp; TRADEMARK OFFICE</p> </div> </div>		<p><b>Complete If Known</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Application Number</td> <td style="width: 50%;">09/890,440</td> </tr> <tr> <td>Filing Date</td> <td>1 August 2001</td> </tr> <tr> <td>First Named Inventor</td> <td>YONG-WOON HAN</td> </tr> <tr> <td>Examiner Name</td> <td>Leung, Philip H.</td> </tr> <tr> <td>Group/Art Unit</td> <td>3742</td> </tr> <tr> <td>Attorney Docket No.</td> <td>P56560PCT</td> </tr> </table>		Application Number	09/890,440	Filing Date	1 August 2001	First Named Inventor	YONG-WOON HAN	Examiner Name	Leung, Philip H.	Group/Art Unit	3742	Attorney Docket No.	P56560PCT																																																																																																																																																																												
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<p><b>METHOD OF PAYMENT (check one)</b></p> <p>1. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any deficiencies:</p> <p>Deposit Account Number: <u>02-4943</u></p> <p><input type="checkbox"/> Charge Any Additional Fee Required Under 37 C.F.R. §1.16 and 1.17.</p> <p><input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27</p> <p>2. <input checked="" type="checkbox"/> Payment Enclosed:          (CHECK #45973)  <input type="checkbox"/> Check <input type="checkbox"/> Credit Card <input type="checkbox"/> Money Order <input type="checkbox"/> Other</p>		<p><b>FEE CALCULATION (continued)</b></p> <p>3. 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REB/as

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.



PATENT  
P56560PCT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

YONG-WOON HAN et al.

Serial No.: 09/890,440

Examiner: LEUNG, PHILIP H.

Filed: 1 August 2001

Art Unit: 3742

For: DRIVING CIRCUIT OF DC MICROWAVE OVEN AND METHOD OF  
CONTROLLING THE SAME

**INFORMATION DISCLOSURE STATEMENT**

Mail Stop:  
Commissioner for Patents  
P.O.Box 1450  
Alexandria, VA 22313-1450

Sir:

In accordance with 37 C.F.R. §1.56, and §§1.97 and 1.98 as amended, Applicant cites, describes, and provides copies of the following art references:

**U.S. PATENT REFERENCE:**

- U.S. Patent No. 5,181,160 to Okamoto et al., entitled DRIVING CIRCUIT FOR INVERTER MICROWAVE OVEN, issued 19 January 1993;
- U.S. Patent No. 5,237,140 to Akazawa et al., entitled A-C/D-C MICROWAVE OVEN, issued 17 August 1993;
- U.S. Patent No. 5,171,949 to Fujishima et al., entitled SWITCHING POWER SUPPLY FOR MICROWAVE OVEN, issued 15 December 1992; and
- U.S. Patent No. 4,904,837 to Low et al., entitled POWERED MICROWAVE OVEN, issued 27 February 1990.

**FOREIGN PATENT REFERENCES:**

- Japanese Patent No. 2801367 to Akazawa et al., entitled MICROWAVE OVEN, issued 10 July 1998;
- Japanese Patent No. 2651927 to Yuasa et al., entitled HIGH FREQUENCY HEATING DEVICE, issued 23 May 1997;
- Japanese Patent Publication No. 06-076935 to Koh, entitled MICROWAVE OVEN DRIVE SYSTEM, published 18 March 1994;
- Japanese Patent Publication No. 05-094869 to Minamino, entitled DRIVE CIRCUIT FOR INVERTER MICROWAVE OVEN, published 16 April 1993;
- European Patent Publication No. 0-289-032 to Nakabayashi et al., entitled HIGH FREQUENCY HEATING EQUIPMENT, published 8 July 1992;
- Japanese Patent Publication No. 04-087185 to Sawai, entitled DRIVER CIRCUIT FOR INVERTER TYPE MICROWAVE OVEN, published 19 March 1992;
- Japanese Patent Publication No. 04-087183 to Kodama, entitled DRIVER CIRCUIT FOR INVERTER TYPE MICROWAVE OVEN, published 19 March 1992;
- Japanese Patent Publication No. 04-087184 to Kodama, entitled DRIVER CIRCUIT FOR INVERTER TYPE MICROWAVE OVEN, published 19 March 1992;
- Japanese Patent Publication No. 03-295189 to Kodama, entitled DRIVE CIRCUIT FOR INVERTER MICROWAVE OVEN, published 26 December 1991;
- Japanese Patent Publication No. 03-283289 to Kodama, entitled DRIVING CIRCUIT FOR INVERTER MICROWAVE OVEN, published 13 December 1991;
- European Patent Publication No. 0-389-047 to Bruning et al., entitled HIGH FREQUENCY HIGH VOLTAGE POWER SUPPLY WITH CONTROLLED

OUTPUT POWER, published 26 September 1990;

- European Patent Publication No. 0-289-032 to Suenaga et al., entitled  
MAGNETRON FEEDING APPARATUS AND METHOD OF CONTROLLING  
THE SAME, published 2 November 1988.

#### **OTHER DOCUMENTS:**

- Office Action issued from Japanese Patent Office, dated 18 May 2004; and
- Search Report issued from European Patent Office, dated 7 July 2004.

#### **DISCUSSION**

Okamoto US'160, which was cited as being *particularly relevant* if taken alone by the European Patent Examiner in the European *Search Report* issued on 7 July 2004 in Applicant's corresponding European Patent Application No. EP 00986015.6, relates to a driving circuit for an inverter microwave oven which includes a push-pull voltage type inverter circuit having two sets of switching element groups each provided with more than two switching elements connected in parallel to each other for switching the D.C. current supplied from a D.C. power source, a control device arranged to set a period for simultaneously turning OFF the two sets of switching element groups and to alternately turn ON the switching element groups by the same duty cycle, a step up transformer supplied, at its primary winding having a center tap, with A.C. current from the inverter circuit, and a voltage doubler rectifier circuit connected to a secondary winding of the step-up transformer for supplying electric power to a magnetron through a capacitor. The driving circuit is set so that one half period of a waveform of current flowing through the switching elements becomes equal to the duty cycle by adjusting the leakage inductance of the step-up transformer, the capacitance value of the capacitor and the circuit resistance of the voltage doubler rectifier circuit or the duty cycle of the switching elements.

Akazawa et al. US'140 relates to an a-c/d-c microwave oven adapted to be connected to an

a-c and/or d-c power source. The oven has an inverter for converting d-c power to a-c power to feed power to a magnetron generating high-frequency energy via a transformer. Input from the d-c and a-c power sources is selectively fed to the magnetron. A first primary winding is fed commercial a-c power. A second primary winding is fed on a-c voltage from the inverter. A secondary winding connecting to the magnetron is wound on the transformer. A predetermined voltage is adjusted in the secondary winding of the transformer by adjusting the frequency of the a-c voltage from the inverter at a higher level than the commercial a-c power, which is fed to the second primary winding.

Fujishima et al. US'949 relates to a switching power supply for a microwave oven in which DC power is changed to a pulse form by means of a switching element coupled to a primary winding of an inverter transformer to supply the power to a high frequency oscillator (hereinafter referred to as a magnetron) coupled to a secondary wiring. A reference voltage is set lower than an ordinary state from the time of turning on until the oscillating of the magnetron starts. Accordingly, power supplied from the secondary winding of the inverter transformer to the magnetron is set to a low level. The reference voltage increases when oscillation of the magnetron starts, and returns to the ordinary state when the oscillation returns to the ordinary state.

Low et al. US'837 relates to a microwave oven suitable for use on transports where DC power is available. The microwave oven employs a first inverter to generate internal AC power that is then used to operate the microwave components other than the magnetron microwave source. The internal AC power is passed with relatively low current through the oven interlocks to activate and drive a power inverter that, through an additional output transformer winding, delivers high voltage power to the magnetron. In a preferred embodiment a relay, that is connected to sense when external AC power is available, causes an automatic switching that decouples the internal AC power from the power inverter to enable conventional operation from external AC line power. When external AC line power is no longer applied, the microwave oven automatically switches to operate from the available DC power.

Akazawa et al. JP'367 relates to two relay contacts in a power-source line in the microwave oven of a configuration of supplying power at the magnetron which has two power sources and outputs radio-frequency energy, respectively, according to an individual door switch which operates according to closing motion of the door of a microwave oven is formed corresponding to each above-mentioned power-source lines, respectively.

Yuasa et al. JP'927 relates to an inverter power source which rectifies commercial alternating current supply voltage, changes this into the alternating current power of the frequency of arbitration, and drives a magnetron.

Koh JP'935 relates to improving a manufacturing yield for a microwave oven driving system in a simple constitution by driving a microwave oven, when using either a DC power source charged in a storage battery or an AC power source, supplied through an external line. A system controller 110 senses whether the type of a drive power source is AC or DC. Based on the result, an AC/DC sensing means 100 outputs a signal used in a microwave oven. If an output signal is carried as AC, a square-wave pulse having a definite period is output from a low-voltage transistor circuit and is transmitted through a diode, an attenuator including a resistor, and a capacitor. Then a generated power source voltage is input to the controller 110 through a transistor. If the output signal is carried as DC, it is supplied to a magnetron 200, which is driven to supply its output to the controller 110, and the microwave oven is operated by DC.

Minamino JP'869 relates to a microwave small in size and light in weight letting the primary winding of a set-up transformer and the group of switching elements form a closed loop, and connecting the connecting points of the group of the elements and the center tap of the primary winding of the transformer to a low voltage capacitor. A DC power supply 1 is connected to the group of switching elements 8a and 8b via choke coil 11 and a low voltage capacitor 12, and the other end of the power supply is connected to the primary winding center tap 3c of a step-up transformer 3. When the power MOSFET of the group of the elements 8a is turned on, current flows

to the voltage double rectifier of the secondary circuit 4 of the transformer 3 and the closed loop of a magnetron 5, so that electric energy is supplied to the magnetron 5. When the MOSFET of the group of the elements 8a is turned off, electric energy stored in the transformer 3 is regenerated to the power supply 1 while being supplied to the magnetron. High frequency electric power is supplied to the magnetron 5 with the aforesaid action repeated. By this constitution, no AC/DC inverter is required, thus a drive circuit which is inexpensive and high in output can thereby be provided.

Nakabayashi JP'032 relates to equipment which includes a DC power supply comprising a power generator (20), an electric power generator (22) and a rectifying means (23), an inverter power supply (24) which boosts the output voltage of the DC power supply and drives a magnetron (28), and an inverter controlling part for controlling the inverter power supply (24) according to the output of a generator output detecting means (31) for detecting the output of the DC power supply. A function of dielectric heating can be exhibited stably by controlling the operating state of the inverter power supply (24) through the use of the output of the DC power supply.

Sawai JP'185 relates to a power supply circuit using a low-voltage DC power supply, with which a high output is assured at a low cost, by varying the ON time of a switching element by a control means periodically and continuously wherein the predetermined maximum ON time is observed as the upper limit. A driver circuit for inverter type microwave oven is equipped with a push-pull voltage type inverter circuit 2 which converts the output power of an independent type DC power supply 1 into a high frequency electric power, a booster transformer 3 for the supply voltage, and a voltage doubler half-wave rectifying circuit 4 which rectifies the output of this booster transformer 3, and with the output from the last named circuit 4 a magnetron 5 is driven. Switching element drive circuits 9a, 9b and a control circuit 10 are provided as a control means to vary periodically and continuously the ON time of switching elements 8a, 8b of the abovementioned circuit 2 in push-pull system (or bridge system), wherein the predetermined maximum ON time is used as the upper limit. This permits accomplishing a power supply circuit using a low-voltage DC

power supply, with which a high power utilization factor and a high output are assured at a low cost.

Kodama JP'183 relates to high output power and high efficiency through the use of a low-voltage DC power supply by furnishing four switching elements to switch DC current, and providing a bridge inverter circuit which switches these switching elements when the level of the current waveform is substantially nullified. A driver circuit for an inverter type microwave oven comprises a bridge system inverter circuit 2 which converts the DC power of a low-voltage DC power supply 1 into a high frequency electric power, a booster transformer 3 for the supply voltage, and a voltage doubler half-wave rectifying circuit 4 which rectifies the output of this booster transformer 3. A magnetron 5 is driven with the output of this voltage doubler half-wave rectifying circuit 4. The inverter circuit 2 is equipped with four switching elements 8a-8d which switch the DC current and control means 10a, 10b, 11 which switch these elements 8a-8d when the level of the current waveform is substantially nullified. This allows accomplishing a driver circuit for inverter type microwave oven while requiring a low voltage input, with which a high power utilization factor and high output are ensured.

Kodama JP'184 relates to a driver circuit that uses a low voltage DC power supply, which assures a high power utilization factor and high output at a low cost, by connecting two inverter circuits in parallel with the DC power supply, and furnishing two booster transformers. A driver circuit for inverter type microwave oven is equipped with push-pull type inverter circuits 2, 3 and a voltage doubler half-wave rectifying circuit 6, and with the output therefrom a magnetron 7 is driven. In these inverter circuits 2, 3 switching elements 10a, 10b and 11a, 11b, two each, are connected with the primary windings of booster transformers 4, 5 so as to form a closed loop, and the connecting points of these switching elements 10a, 10b and 11a, 11b and center taps 4c, 5c of the primary windings of the booster transformers 4, 5 are connected with the two ends of a DC power supply 1, and the drive is done with a control circuit 13. Therefore, the currents flowing through the primary sides of the booster transformers 4, 5 are switched at a high speed. This permits accomplishing a driver circuit for inverter type microwave oven using a low-voltage DC power



supply; with which a high output and high efficiency are assured at a low cost.

Kodama JP'189 relates to an inexpensive and compact drive circuit of an inverter microwave oven which uses a low-voltage DC power source for the power source and has a very small switching loss by providing a control circuit transiting a power transistor when the level of the resonance voltage wave-form applied across the collector and emitter of the power transistor becomes zero. When a power transistor 3a is turned on, a current flows in a high-voltage diode 6b, a high-voltage choke coil 10, a double voltage capacitor 5, one end 4d of the secondary winding of a booster transformer 4, the other end 4e of the secondary winding, and the closed loop of a magnetron 9 in the secondary circuit of the booster transformer 4, and the electric energy is fed to the magnetron 9. When the circuit is resonated so that the half-periods of the resonance frequencies of the voltage wave-forms applied across the collectors and emitters of the power transistors 3a, 3b are made nearly equal to the on periods of the power transistors 3a, 3b, the cross area of the current and voltage at the time of transition becomes nearly zero, no transition loss is generated at the time of on/off switching of the power transistors 3a, 3b, and the switching loss can be reduced.

Kodama JP'289 relates to using a low-voltage DC power source as power source, to make a driving circuit compact at reduced cost, and to achieve high output by adjusting the leakage inductance of a step-up transformer and the value of the condenser of a voltage doubler rectifier circuit or the duty cycle of a switching element so that half the cycle of the waveform of a current passed through the switching element is set equal to the duty cycle. The current waveform of a switching element is vibrated at characteristic frequency decided by the leakage inductance of a step-up transformer 3, a voltage doubler condenser 7 and circuit resistance. Half the cycle of the characteristic frequency is made equal to the ON time of the switching element by adjustment of the value of the leakage inductance of the step-up transformer or the ON time of the switching element, whereby circuit output power being output is maximized.

Bruning et al. EP'047, which was cited as being *particularly relevant* if taken alone by the

European Patent Examiner in the European *Search Report* issued on 7 July 2004 in Applicant's corresponding European Patent Application No. EP 00986015.6, relates to a push-pull voltage oscillator power supply circuit that includes a parallel resonant LC circuit made up of a capacitor in parallel with the primary of an output transformer. The output power level of the oscillator is controlled or adjusted by gating a drive circuit of the oscillator in accordance with an appropriate timing scheme so as to control the power delivered to the load over a long time period. The drive circuit is switched on and so as to control the transformer primary voltage by omitting a number of drive pulses, determined by the desired output pulse level, so that the oscillator self-oscillates and rings out with a decreasing amplitude of the self-oscillations, but never reaches a complete cut-off of the oscillations before the drive circuit is gated on to refresh the supply of energy to the oscillator. A circuit for monitoring the collector voltages of the switching transistors of the oscillator may be provided to inhibit the supply of drive pulses to the switching transistors when the collector voltages exceed a given voltage level. This limits the power dissipation in the switching transistors.

Suenaga et al. EP'032, which was cited as being *particularly relevant* if taken alone by the European Patent Examiner in the European *Search Report* issued on 7 July 2004 in Applicant's corresponding European Patent Application No. EP 00986015.6, relates to a magnetron feeding apparatus and a method of controlling the magnetron feeding apparatus having an inverter circuit for converting the DC power supply into high-frequency power, a high-tension transformer for converting the high-frequency power into the high-tension power to be applied upon the magnetron, an output voltage detecting portion for detecting the output voltage of the high-tension transformer, an input current detecting portion for detecting the input current into the inverter circuit, a power controlling means for controlling the operation of the inverter circuit by the output voltage information of the output voltage detecting portion and the input current information of the input current detecting portion.

As explained by the Examiner in Applicant's corresponding Application No. 2001-549059 issued on 18 May 2004 by the Patent Office of Japan, the cited references (Japanese Patent No.

2801367 issued on 10 July 1998, Japanese Patent No. 2651927 issued on 23 May 1997, and Japanese Patent Publication No. 06-076935 published on 18 March 1994) are similar to the present invention in terms of objects of the invention. The Examiner stated that the explanation and corresponding references of the present invention are unclear, and accordingly rejected claims 1 through 27 of said invention.

Copies of U.S. Patents and U.S. Patent Application Publications cited in this Information Disclosure Statement are not provided herewith, in accordance with U.S. Patent & Trademark Office OG Notice dated 5 August 2003 stating that the requirement under 37 CFR 1.98 (a)(2)(i) for submitting a copy of each cited U.S. patent and each U.S. patent application publication is waived for all U.S. national patent applications filed after 30 June 2003. A copy of the U.S. Patent & Trademark Office OG Notice dated 5 August 2003 is attached to this Information Disclosure Statement.

The citation of the foregoing references is not intended to constitute an assertion that other or more relevant art does not exist. Accordingly, the Examiner is requested to make a wide-ranging and thorough search of the relevant art.

The fee of \$180.00 is incurred by this Statement pursuant to 37 CFR §1.17(p) and §1.97(d)(2) accompanies this statement.

Respectfully submitted,



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# INFORMATION DISCLOSURE STATEMENT

PTO-1449 (PAGE 1 OF 2)

SERIAL NUMBER 09/890,440

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APPLICANT: YONG-WOON HAN, et al.

FILING DATE: 1 August 2001

GROUP NO.

## U.S. PATENT DOCUMENTS

EXAMINER	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLAS	FILING DATE
	5,181,160	1/19/93	Okamoto, et al.			7/19/91
	5,237,140	8/17/93	Akazawa, et al.			5/2/91
	5,171,949	12/15/92	Fujishima, et al.			10/31/90
	4,904,837	2/27/90	Low, et al.			7/19/91

## FOREIGN PATENT DOCUMENTS

## TRANSLATION

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLAS	YES	NO
	JP 2801367	7/10/98	JAPAN			Abstract	
	JP 2651927	5/23/97	JAPAN			Abstract	
	JP 06-076935	3/18/94	JAPAN			Abstract	
	JP 05-094869	4/16/93	JAPAN			Abstract	
	EP 0-289-032	7/8/92	EUROPE			Abstract	
	JP 04-087185	3/19/92	JAPAN			Abstract	
	JP 04-087183	3/19/92	JAPAN			Abstract	
	JP 04-087184	3/19/92	JAPAN			Abstract	
	JP 03-295189	12/26/91	JAPAN			Abstract	
	JP 03-283289	12/13/91	JAPAN			Abstract	
	EP 0-389-047	9/26/90	EUROPE			Abstract	
	EP 0-289-032	11/2/88	EUROPE			Abstract	

**OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)**

Office Action issued from Japanese Patent Office, dated 18 May 2004 (no translation attached);  
Search Report issued from European Patent Office, dated 7 July 2004.

**EXAMINER:**

**DATE CONSIDERED:**

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.*

**United States Patent and Trademark Office OG Notices: 05 August 2003**

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**Background**

The U.S. Patent and Trademark Office (USPTO or Office) regulations concerning Information Disclosure Statements (IDSs) currently require that copies of the cited references be submitted with the IDS listing. See 37 CFR 1.98 (a)(2). In a prior notice in the Official Gazette this requirement was partially waived with respect to U.S. patents and U.S. patent application publications when an applicant submitted an IDS using the Office's electronic filing system (as an electronic IDS, eIDS). See Legal Framework for the Use of the Electronic Filing System, 1263 Off. Gaz. Pat. Off. 60, 10/8/2002, Part V.

All U.S. applications<sup>1</sup> filed after June 30, 2003 are stored in electronic form in the Office's Image File Wrapper (IFW) system.<sup>2</sup> IDSs submitted for these electronic applications are processed by Office staff to create an electronic link which permits cited U.S. patents and U.S. patent application publications to be conveniently viewed by examiners through the Office's patent search system. This feature enables the Office to avoid scanning these documents into IFW, obviating the need for their submission.

**Waiver**

The Office hereby waives the requirement under 37 CFR 1.98 (a)(2)(i) for submitting a copy of each cited U.S. patent and each U.S. patent application publication for all U.S. national patent applications filed after June 30, 2003 and for all international applications that have entered the national stage under 35 USC 371 after June 30, 2003. See 37 CFR 1.491(b). For all patent applications filed on or before June 30, 2003, copies of cited U.S. patents and patent application publications are still required unless an eIDS is filed.

Applicants are still required to submit copies of foreign patent documents and non-patent literature in accordance with 37 CFR 1.98(a)(2).

**FOR FURTHER INFORMATION CONTACT:**

Questions concerning this waiver may be submitted to Jay Lucas by e-mail at Jay.Lucas@uspto.gov or by telephone at (703) 308-6868. Comments may also be submitted by mail addressed to: Commissioner for Patents, Box Comments - Patents, Post Office Box 1450, Alexandria, VA 22313-1450, or by facsimile to (703) 305-2919, marked to the attention of Jay Lucas.

STEPHEN G. KUNIN  
Deputy Commissioner for  
Patent Examination Policy

<sup>1</sup> Except in special situations, such as in applications under secrecy order or containing national security markings.

2 See Notification of United States Patent and Trademark Office Patent Application Records being Stored and Processed in Electronic Form, 1271 Off. Gaz. Pat. Off. 100, 6/17 2003.